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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,007	09/24/2003	Rie Sato	242635US6RD	1801

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ALEXANDRIA, VA 22314

EXAMINER

ROSE, KIESHA L

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 03/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/669,007

Applicant(s)

SATO ET AL.

Examiner

Kiesha L. Rose

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) of (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to the request for reconsideration filed 19 December 2005.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,2,4,6,7,10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawato (U.S. Publication 2004/0061978) and Shimazawa (U.S. Publication 2002/0097537).

In re claims 1,7 and 10, Kawato discloses a magnetic sensor that contains an emitter (11b), a collector (101) formed adjacent to the emitter, a base (21a) formed between the emitter and the collector and having a magnetization pinned layer of ferromagnetic material (42a), a magnetization free layer of ferromagnetic material (44a) and a nonmagnetic layer (43a) between the magnetization pinned layer of ferromagnetic material and the magnetization free layer of ferromagnetic material, the magnetization pinned layer having a magnetization substantially fixed in an applied magnetic field, the magnetization free layer having a magnetization substantially free to

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rotate under the applied magnetic field, and the nonmagnetic layer decoupling exchange coupling between the magnetization free layer of ferromagnetic material and the magnetization pinned layer of ferromagnetic material. Kawato discloses all the limitations except for a tunnel barrier layer. Whereas Shimazawa discloses magneto resistive tunnel device (Fig. 3) that contains a tunnel barrier layer (30) of antiferromagnetic material formed between the magnetization pinned layer of ferromagnetic material (40) and the emitter (75) or between the collector (71) and the magnetization pinned layer of ferromagnetic material (40) and provided with an exchange coupling with the adjoining magnetization pinned layer of ferromagnetic material, the magnetization of the magnetization pinned layer of ferromagnetic material being fixed by the exchange coupling between the magnetization pinned layer of ferromagnetic material and the tunnel barrier of antiferromagnetic material. The tunnel barrier is formed to allow electrons to pass through while keeping the spinning by the tunnel magneto resistive element and to reduce resistance of the element. (Page 4, Paragraphs 44, 45) Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Kawato by incorporating a tunnel barrier layer to allow electrons to pass through while keeping the spinning by the tunnel magneto resistive element and to reduce resistance of the element as taught by Shimazawa.

In re claim 2, Shimazawa discloses the antiferromagnetic material is nickel oxide. (Page 4, Paragraph 45)

In re claim 4, Shimazawa discloses the magnetization pinned layer includes a metal (Ni) and the tunnel barrier of antiferromagnetic material contains the oxide of the metal. (Page 4, Paragraphs 42 and 45)

In re claim 6, Shimazawa discloses another tunnel barrier layer of nonmagnetic dielectric material (91) formed in contact with magnetization free layer of ferromagnetic material.

Claims 3, 8-9 and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawato and Shimazawa, as applied to claims 1,7 and 10 and further in view of Katti et al. (U.S. Patent 6,707,084).

In re claim 3, Kawato and Shimazawa disclose all the limitations except for a nonmagnetic material in contact with the tunnel barrier layer. Whereas Katti discloses a spin valve (Fig. 5) that contains a spin-tunnel transistor and an electric field effect transistor where the spin valve contains a pinned layer of NiFe ferromagnetic layer (404), a Cu nonmagnetic layer (408), a NiFe ferromagnetic layer (412), a nonmagnetic interlayer (502) and a NiO tunnel barrier (504) formed of antiferromagnetic material and is an oxide of the pinned layer. The nonmagnetic layer is in contact with the antiferromagnetic tunnel barrier layer to adjust or select the amount of coupling between the antiferromagnetic layer and the soft layer (ferromagnetic layer (412)) by reducing the coupling strength between the antiferromagnetic layer and the hard layer (ferromagnetic layer (404)) (Column 7, lines 49-53) Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the devices of Kawato and Shimazawa by incorporating a nonmagnetic layer in

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contact with the tunnel barrier layer to adjust or select the amount of coupling between the antiferromagnetic layer and the soft layer (ferromagnetic layer) by reducing the coupling strength between the antiferromagnetic layer and the hard layer (ferromagnetic layer) as taught by Katti.

In re claims 8 and 11, Katti discloses the collector electrically coupled with an electrical field effect transistor, and the spin-tunnel transistor and the electrical field transistor are formed on the same substrate. (Page 1, lines 24-34)

In re claims 9 and 12, Kawato discloses a magnetic flux guide (65) magnetically coupled with the magnetization free layer. (Fig. 9)

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawato and Shimazawa as applied to claim 1 above, and further in view of Hasegawa et al. (U.S. Publication 2003/0042903).

Kawato and Shimazawa disclose all the limitations except for the tunnel barrier formed between the pinned layer and the emitter and the emitter contacts the tunnel barrier. Whereas Hasegawa discloses magnetic detection device (Fig. 7) that contains a pinned layer (31), a tunnel barrier (67) formed between the pinned layer and an emitter (68), where the emitter contacts the tunnel barrier. The tunnel barrier is formed between the pinned layer and the emitter and contacts the emitter to allow a current passing through the emitter into the multilayer to be properly led into the multilayer without being shunted to the pinned layer. Hence, the structure of the magnetic detection device makes it possible to manufacture CPP type magnetic

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detection devices with high reproduction outputs that are capable of preventing the current from spreading beyond the track width. (Page 16, Paragraph 255) Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the devices of Kawato and Shimazawa by incorporating the tunnel barrier layer between the pinned layer and the emitter and contacting the emitter to allow a current passing through the emitter to be properly led into the multilayer without being shunted to the pinned layer as taught by Hasegawa.

Response to Arguments

Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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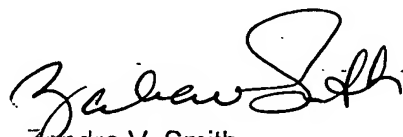
extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kiesha L. Rose whose telephone number is 571-272-1844. The examiner can normally be reached on M-F 8:30-6:00 off 2nd Mondays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


KLR


Zandra V. Smith
Supervisory Patent Examiner
3 March 2006